Patrick Kastner

Postdoctoral Associate — Environmental Systems Lab
Cornell University, NY, USA

pk373@cornell.edu
linkedin.com/in/patrickkastner
www.patrickkastner.de

ABOUT

Patrick Kastner is a systems engineer interested in environmental modeling to inform multi-objective decision-making in urban design. His is the lead developer of *Eddy3D*, a performance-driven design software tool to predict outdoor thermal comfort in cities. *Eddy3D* is currently used at leading architectural firms including KPF, Henning Larsen, Gensler, and Foster + Partners, and by researchers and educators from institutions including TU Munich, MIT, UPenn, ETH, Harvard, and Cornell.

EDUCATION

Ph.D.	Cornell University · *Systems Science and Engineering*, 2022	
M.S.	Cornell University · *Systems Engineering*, 2021	
M.S.	Technical University of Munich · *Sustainable Building Science*, 2017	
Hon. D.	Center for Digital Technology and Management (CDTM) · *Technology Management*, 2017	
B.S.	FAU Erlangen-Nuremberg · *Energy Engineering*, 2012	

PROFESSIONAL EXPERIENCE

Since 22	**Cornell University** · *Postdoctoral Associate* Decision support on building stock decarbonization as part of Ithaca's Green New Deal. ⬀	Ithaca, NY, US
2022-22	**Cornell University** · *Lecturer & Development Lead* Lecturer for *SYSEN 5160 - Managing & Modeling Cmplx. Systems for Org. Leaders*. ⬀	Ithaca, NY, US
2018-22	**Cornell University** · *Graduate Research Assistant (GRA)* GRA at the Environmental Systems Lab working on Eddy3D. ⬀	Ithaca, NY, US
2017-18	**Cornell University** · *Visiting Scientist (VS)* VS at the Environmental Systems Lab working on Eddy3D. ⬀	Ithaca, NY, US
2017	**Sensonium GmbH** · *External Consultant — Product Management* Product manager for an IoT smart home security prototype.	Munich, DE
2017	**Transsolar Energietechnik GmbH** · *CFD Engineer* Assessed ventilation potential of urban designs with CFD. ⬀	Munich, DE
2016	**United Nations World Food Programme (WFP)** · *Scenario Analyst* Carried out trend research and scenario analysis for the WFP Innovation Accelerator. ⬀	Munich, DE
2013-16	**Transsolar Energietechnik GmbH** · *Working Student (WS) / Thesis* WS / M.S. Thesis in Energy & Sustainability Engineering. ⬀	Munich, DE
2012-13	**juwi Energieprojekte GmbH** · *Quantitative Analyst* Site Assessment intern for wind energy project development.	Wörrstadt, DE
2011-12	**Fraunhofer IISB** · *Research Assistant (RA) / Thesis* RA & B.S. Thesis in the silicon crystal growth department. ⬀	Erlangen, DE

PUBLICATIONS

Journal Articles

2021   **Kastner, P.**, Dogan, T. "Eddy3D: A Toolkit for Decoupled Outdoor Thermal Comfort Simulations in Urban Areas." *Building and Environment*. 🔗

2021   Young, E., **Kastner, P.**, Dogan, T., Chokhachian, A., Mokhtar, S. and Reinhart, C. "Modeling Outdoor Thermal Comfort along Cycling Routes at Varying Levels of Physical Accuracy to Predict Bike Ridership in Cambridge, MA." *Building and Environment*. 🔗

2021   Dogan, T., **Kastner, P.**, Mermelstein, Remy "Surfer: A Fast Simulation Algorithm to Predict Surface Temperatures and Mean Radiant Temperatures in Large Urban Models." *Building and Environment*. 🔗

2020   Dogan, T., **Kastner, P.** "Streamlined CFD Simulation Framework to Generate Wind-Pressure Coefficients on Building Facades for Airflow Network Simulations." *Building Simulation*. 🔗

2020   Natanian, J., **Kastner, P.**, Dogan, T., Auer, T. "From Energy Performative to Livable Mediterranean Cities: An Annual Outdoor Thermal Comfort and Energy Balance Cross-Climatic Typological Study." *Energy and Buildings*. 🔗

2019   **Kastner, P.**, Dogan, T. "A Cylindrical Meshing Methodology for Annual Urban Computational Fluid Dynamics Simulations." *Journal of Building Performance Simulation*. 🔗

Conference Proceedings (peer-reviewed)

2021   De Simone, Z., **Kastner, P.**, Dogan, T. "Towards Safer Work Environments During the COVID-19 Crisis: A Study Of Different Floor Plan Layouts and Ventilation Strategies Coupling OpenFOAM and Airborne Pathogen Data for Actionable, Simulation-based Feedback in Design." in *Building Simulation 2021*, Bruges, Belgium. 🔗

2020   **Kastner, P.**, Dogan, T. "Solving Thermal Bridging Problems for Architectural Applications with OpenFOAM." in *SimAUD 2020*, Vienna, Austria. 🔗

2020   **Kastner, P.**, Dogan, T. "Predicting Space Usage by Multi-Objective Assessment of Outdoor Thermal Comfort around a University Campus." in *SimAUD 2020*, Vienna, Austria. 🔗

2019   **Kastner, P.**, Dogan, T. "Towards High-Resolution Annual Outdoor Thermal Comfort Mapping In Urban Design." in *Building Simulation 2019*, Rome, Italy. 🔗

2018   Dogan, T., **Kastner, P.** "Streamlined CFD Simulation Framework to Generate Wind-Pressure Coefficients on Building Facades for Airflow Network Simulations." in *Intern. Building Physics Conference*, Syracuse , NY. 🔗

2018   **Kastner, P.**, Dogan, T. "Streamlining Meshing Methodologies for Annual Urban CFD Simulations." in *eSim 2018 IBPSA Canada*, Montreal. 🔗

Book Chapters

2021   *Kastner, P.*, Dogan, T. (2020). Eddy. In S. Price, J. T. Soley (Eds.), Association/11. essay, Cornell AAP Publications.

2018   *Kastner, P.*, O'Donnell, M. C., Padmakumara, L., Borrmann, K., Braun, P. (2018). Societal & Environmental Trends. In Bechthold, L., & Lachner, F. (Eds.), "CDTM Trend Report Spring 2016. Fighting Hunger in the Digital Era". Munich: Center for Digital Technology and Management. ISBN: 978-3-9818511-1-3. 🔗

2018   *Kastner, P.*, Hahn, D., Marquardt, J., Chen, Y., Cardona, F. (2018). World Food Network. In Bechthold, L., & Lachner, F. (Eds.), "CDTM Trend Report Spring 2016. Fighting Hunger in the Digital Era". Munich: Center for Digital Technology and Management. ISBN: 978-3-9818511-1-3. 🔗

2018   Secules, C., *Kastner, P.*, Borrmann, K., Padmakumara, L., Wessling, S. (2018). Cropspot. In Bechthold, L., & Lachner, F. (Eds.), "CDTM Trend Report Spring 2016. Fighting Hunger in the Digital Era". Munich: Center for Digital Technology and Management. ISBN: 978-3-9818511-1-3. 🔗

Theses

2022   Ph.D. — A Decoupled Framework for Fast and High-resolution Simulations of Annual Outdoor Thermal Comfort.

2016   M.S. — Customizing OpenFOAM to Assess Wind-induced Natural Ventilation Potential of Classrooms: A Case Study for BRAC University. ⧉ ▥

2012   B.S. — Structural and Electrical Assessment of Multi-crystalline String-Ribbon Silicon. ⧉ ▥

TEACHING

2022-Sp   Lecturer for SYSEN 5160 - Managing & Modeling Complex Systems for Organizational Leaders ⧉

2021-Fa   RA for SYSEN 5160 - Course Development: Managing & Modeling Complex Systems for Organizational Leaders — supervised by Dr. H. Oliver Gao ⧉

2021-Sp   TA for ARCH 4619 - Augmented Intelligence in Design — Instr.: Dr. Timur Dogan ⧉

2021-Sp   TA for SYSEN 5400 - Theory and Practice of Systems Architecture — Instr.: Dr. H. Oliver Gao ⧉

2019-Fa   TA for SYSEN 6600 - Applied Model-Based Systems Engineering I — Instr.: Dr. David R. Schneider ⧉

Guest Lectures (GL), Workshops (WS) & Panels (P)

2022-GL   *Urban Wind Flow with Eddy3D* — MUD 600 — Modeling Urban Environmental Performance — Thomas Jefferson University. ⧉

2022-P   *The Mathematics of Innovation Panel* — "The Mathematics of Innovation" (CRC Press, Taylor and Francis Group) is a forthcoming book exploring the utility of DSRP and structural predictions on innovation and discovery and how they might minimize cognitive bias. ⧉

2021-GL   *Urban Wind Flow with Eddy3D* — ARCH 753-001 (Fa.) — Building Performance Simulation — UPenn Weizmann School of Design. ⧉

2021-GL   *Urban Wind Flow with Eddy3D* — ARCH 753-001 (Sp.) — Building Performance Simulation — UPenn Weizmann School of Design. ⧉

2019-WS   *Eddy3D: Wind and Comfort Simulation in Grasshopper3D* — Performance Network. ⧉

2019-GL   *Informing Early Design via Natural Ventilation Assessment* — ARCH 4101 - ProjectZERO Option Studio — Cornell AAP. ⧉

2018-WS   *Natural Ventilation Prediction In and Around Buildings Using Eddy3D and Archsim* — IBPC2018 Conference. ⧉

Student Supervision

2022   Phuc Vo, *M.Eng. Systems Engineering*, GTRS for SYSEN 5160 ▤

2021   Ji Yoon Bae, *M.S. Matter Design Computation*, Research Project ▤

2021   Zoe De Simone, *B.Arch*, Research Project & Thesis ▤ ⧉

2021   Remy Mermelstein, *B.Arch*, Research Project & Thesis ▤ ⧉

2020   Allison Bernett, *M.Arch.*, Thesis ▤ ⧉

2020   Mian Jia, *M.S. Matter Design Computation*, Research Project ▤ ⧉

2019   Anna Makido, *M.S. Regional Science*, Thesis ▤ ⧉

AWARDS AND PRESS

Awards, Fellowships & Competitions

2020   Cornell Atkinson Center for Sustainability — Rapid Response Fund, $10,000

2019   Cornell Graduate School Conference Grant, $700

2018   Cornell Graduate School Conference Grant, $700

2018   Cornell Graduate Fellowship (Systems)

2017   Poster Competition at the Cornell Atkinson Center for a Sustainable Future — 2nd prize, $2,000 ⊡

2017   Digital Business Model Competition at Viessmann Group — 1st prize, $3,000 implementation: ⊡

2016   Member of the Elite Network of Bavaria

2016   TUM Hochschulstiftung Scholarship

2015   Dr. Dettling Scholarship

2015   ERASMUS Exchange Scholarship

2014   Hans Rudolf Scholarship

2013   Gustav Schickedanz Scholarship

2013   efellows.net Scholarship

Press & Interviews

2022   Bloomberg CityLab: *To Get to Net Zero, This City Is Making a Map* ⊡

2022   Coalition of Academic Scientific Computing (CASC): *The architecture of air*. In Insights & Innovation: Computational Science at the Forefront of a Changing World (2022) ⊡

2022   Washington Post: *This U.S. city just voted to decarbonize every single building* ⊡

2021   NPR: *To fight climate change, Ithaca votes to decarbonize its buildings by 2030* ⊡

2021   The Architects Newspaper: *Ithaca will decarbonize all 6,000 of the city's buildings* ⊡

2021   Cornell Chronicle: *Software tool breathes life into post-COVID office airflow* ⊡

2021   Cornell Engineering: *Meet Patrick Kastner* ⊡

2020   Cabrera Research Lab: *How to make optimal decisions in complex environments* ⊡

ENTREPRENEURSHIP EXPERIENCE

2016-17   **TEDxTUM** ⊡ — *Operations Manager*   Munich, DE
- Established and led operations for the core team and helped organize 4 major events (*TEDxTUM Salon 2016: The common extraordinary*, *TEDxTUM 2016: Entelechy*, *TEDxTUM Salon 2017: Reconnect*, *TEDxTUM 2017: Reformations of tomorrow*) hosting 2500+ attendees.

2009-23   **Frankenslot** ⊡ — *Co-Founder & Freelancer*   Cadolzburg, DE
- Co-Founded, developed, and sold a company that custom-develops replacement parts for scale model cars.
- Continued as a freelance system administrator maintaining the LAMP stack (website, SEO, IT, e-commerce implementation, mobile payments, etc.).

SKILLS

Programming: Python, C#, Matlab, Javascript, SQL, HTML, CSS

Specialized Tools: OpenFOAM, Radiance, Git, Docker, Kubernetes, HPC, DevOps, LaTeX

Design/CAD: Adobe, Rhinoceros & Grasshopper

Research Methods: Systems Engineering, Systems Thinking, Design Thinking

Languages: English, German